Frequency of Tuberculous Lesions Discovered at Autopsy at Los Angeles County General Hospital, 1918-1948

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ANALYSIS of the records of the 40,130 postmortem examinations performed at the Los Angeles County General Hospital during the past 30 years reveals many interesting findings. Throughout this time there have been approximately 50 per cent more males than females autopsied. Nearly one-sixth of the autopsies were on Mexicans and only one-fifteenth were on negroes. The proportion of negroes has nearly doubled, while the proportion of Mexicans is now less than half of what it was a generation ago and the proportion of white patients other than Mexicans has increased slightly. The age distribution has greatly changed. The median age at autopsy, which was 40 years a generation ago, is now in the middle fifties. Patients over 70 years of age, who constituted less than 10 per cent in 1918, now represent more than one-quarter of all of the autopsies.

Some of the changes in the composition of the autopsy population merely reflects changes in the population of the County of Los Angeles. Other differences are due to changes in the relative incidence and mortality from various conditions during this time. The ratio of deaths in the hospital to total admissions has averaged less than 10 per cent. Despite the increase in recent years in the age of patients at time of death, which reflects the changing age of the total population, there has been a slight decrease in this ratio. Autopsy has been done on more than 35 per cent of all patients who died in the hospital. This figure has increased from less than 20 per cent in the early years of the study to more than 40 per cent in the last decade. An additional 15 per cent of the patients who died have been autopsied by the coroner, so that altogether about half of all patients who died at the Los Angeles County General Hospital have been examined postmortem.

The decline of tuberculosis mortality rates in Los Angeles County during this time has been even more rapid than in the state or in the nation as a whole. However, owing to the continuously increasing population in the county the actual number of deaths from tuberculosis has fallen more slowly. There has also been an increasing use of hospital facilities for the treatment of tuberculosis. The number of beds on the tuberculosis service at the General Hospital has increased from less than 100 to more than 300 during this time. There has been an even greater increase in the number of beds for the care of tuberculosis in other institutions in the county. Approximately 4,000 beds are now available in tuberculosis institutions in Los Angeles County, or about four beds per tuberculosis death occurring here annually. The tuberculosis service at the Los Angeles County General Hospital comprised about one-quarter of all the beds for this purpose in the county at the beginning of the period, but now less than one-tenth.

As the entire hospital has similarly grown, the tuberculosis service has constituted about 10 per cent of all the beds at the General Hospital. The average length of stay of patients at the General Hospital in the tuberculosis service has increased during this time from about one month to three months, so that the number of admissions per annum on the tuberculosis service has shown relatively little change. The average duration of patients' stay on other services at the General Hospital has been only about two weeks and even this has diminished slightly in more recent years. Accordingly, the relative number of admissions on the tuberculosis service has declined from about 5 per cent of all admissions in the earlier years to less than 3 per cent of all admissions in more recent years.

Despite the reduction in the relative proportion of tuberculous patients to all patients admitted to the hospital, and to the total number of patients in tuberculosis institutions, and the pronounced reduction in the tuberculosis death rate in the entire community, the policy of admitting the more seriously ill tuberculous patients to the General Hospital has resulted in a relatively stable mortality rate on this service. Thus about 350 deaths from tuberculosis (or about a sixth to a third of all deaths from this disease in the county) have occurred annually on the tuberculosis service of the General Hospital throughout this period.

About half of the patients who were found at autopsy to have died of tuberculosis in the Los Angeles General Hospital died on services other than that of tuberculosis. This was due in part to deaths from tuberculous meningitis on the contagious disease service and to deaths of patients with nonpulmonary tuberculous diseases for which they had been treated on orthopedic, pediatric, or other services. Other tuberculous patients were cared for in the jail ward, on the pneumonia service or in other wards, despite known tuberculosis, because the tu-

Aided by grants from the California Tuberculosis and Health Association and from the Los Angeles County Tuberculosis and Health Association.

Presented at the annual meeting of the California Tuberculosis and Health Association and the California Trudeau Society, March 30-April 1, 1950, San Diego.

berculosis service lacked adequate bed facilities. Other patients, in whom tuberculosis was not recognized during their lives, were treated under various diagnoses on other services but were found at autopsy to have died of tuberculosis. These errors were balanced by cases in which the clinical diagnosis of tuberculosis could not be confirmed by autopsy findings. It appears, therefore, that about half of all patients who die of tuberculosis in Los Angeles County die in the Los Angeles County General Hospital.

The 3,635 patients who were judged, at autopsy, to have died of tuberculosis at the Los Angeles County General Hospital during the last 30 years constitute nearly 10 per cent of all the 40,130 cases in which autopsy was done during this period. Tuberculosis, found to be the cause of death in more than 25 per cent of all the cases in which autopsy was done during the first five years of the study, was the cause of death in less than 5 per cent of all the autopsies performed during the last five years. The excess of males over females in the number of patients found to have died of tuberculosis has been even greater than the excess of males in the total number of autopsies carried out.

The relative number of Mexicans showing fatal tuberculosis at autopsy has decreased greatly, from more than half of all cases in which tuberculosis was found at autopsy to be the cause of death in the earlier years covered by this study to less than one-quarter in recent years. The proportion of autopsies showing death due to tuberculosis in negroes has doubled during this time, so that white patient deaths still constitute little more than half of all the deaths here attributed, at autopsy, to tuberculosis. These changes have been due both to differences in the constitution of the population, and to changes in the relative fatality rates from tuberculosis in the different groups. Thus tuberculosis as the primary cause of death in the white patients autopsied dropped by more than 50 per cent in the last half of the period, or from more than 10 per cent in the first half to less than 5 per cent. Tuberculosis as a cause of death among Mexicans autopsied has declined precipitously, from nearly 30 per cent in the earlier years to less than 15 per cent more recently. Among the negroes, the relative decline in the death rate has been much less pronounced; the rate for the first half of the autopsy series was about 12 per cent as compared with 9.5 per cent in the latter part of the series.

There were great differences in the distribution of fatal tuberculosis in the population of different ages. In the cases in which autopsy was done, tuberculosis caused more than 10 per cent of all deaths under the age of one year in the earlier years studied, but less than 1 per cent in the later years. In the earlier years covered by this review, more than one-quarter of all tuberculous deaths were in the age group below 20; in the last few years, less than 2 per cent. On the other hand, whereas in the earlier years less than one-sixth of all tuberculous deaths occurred in patients over 50 years of age, more recently more than one-third of all tuberculous deaths have occurred in that age bracket.

In the course of 40,130 autopsies over a period of 30 years, there were 2,450 instances in which tuberculous lesions were observed and reported among the autopsy diagnoses but death was considered to have been attributable to non-tuberculous conditions. These 2,450 diagnoses of non-fatal tuberculosis represent only a small fraction of the total number of tuberculous lesions that actually existed at the time of autopsy. In general, they were the larger,

TABLE 1.—*Data on Tuberculosis Relative to Total Admissions, Los Angeles County General Hospital, 1918-1948*

	1918-37	Per Cent	1938-48	Per Cent	Total 1918-48	Per Cent
Admissions	622,599	....	545,540	....	1,168,139	....
Deaths	60,880	9.8	51,529	9.5	112,409	9.6
Autopsies	18,971	31	21,159	42	40,130	36
Male	11,640	61	13,046	62	24,686	61
Female	7,331	39	8,113	38	15,444	39
Caucasian	14,005	74	16,717	79	30,722	77
Mexican	3,568	18	2,429	11	5,997	15
Negro	1,133	6	1,785	9	2,918	7
Others	265	2	228	1	492	1
Age						
0-9	4,014	21	3,363	16	7,377	18
10	793	4	469	2	1,262	3
20	1,470	8	858	4	2,328	6
30	1,895	10	1,536	7	3,431	9
40	2,441	12	2,285	11	4,726	12
50	2,851	14	3,324	16	6,175	15
60	2,698	13	4,205	20	6,903	17
70	1,902	10	3,687	17	5,589	14
80 and over	596	3	1,431	7	2,027	5
Unknown	311	2	1	....	312	1
Autopsies showing tuberculosis	3,109	16	2,976	14	6,085	15
Fatal tuberculosis	2,250	12	1,385	6	3,635	9
Non-fatal tuberculosis	859	4	1,591	8	2,450	6

more conspicuous and more important tuberculous lesions in patients who died of other conditions, although the majority were considered inactive or non-progressive by the pathologist. Pleural adhesions were present in the majority of all autopsies performed during the earlier part of the study, and in the majority of the patients over 50 years of age in the later period. Most of these pleural adhesions were probably due to tuberculous disease, even though this was not often so recorded by the pathologist. Pleural adhesions, healed hilar tuberculous lymph nodes and minor scars and calcifications in the lungs were generally ignored in recording the diagnoses.

Although fatal tuberculosis has diminished greatly during this time, non-fatal tuberculosis has actually been observed more frequently in recent years. This has been chiefly due to the greater survival rate, as regards both tuberculosis and other diseases, and to the consequent increase in the average age of the persons autopsied.

In those cases in which non-fatal tuberculous lesions were observed at autopsy, 72 per cent of the subjects were males. Non-fatal lesions were found more often in other white patients than in Mexicans, or in negroes. This is in keeping with observations made elsewhere, and is only partially accounted for by differences in age distribution. The age at autopsy of persons with non-fatal tuberculous lesions is quite different from that of those who died of tuberculosis; non-fatal lesions were noted in less than 1 per cent of the patients under ten years of age, but in more than 10 per cent of those 70 years of age and over.

A relatively higher proportion of the patients with non-pulmonary tuberculosis complications and non-tuberculous complications of pulmonary disease were apt to be admitted to the Los Angeles County General Hospital than to the Olive View Sanatorium or various other sanatoria. The incidence of non-pulmonary tuberculous complications and non-tuberculous associated conditions in patients autopsied in this series may therefore have been somewhat higher than might have been expected in the total series of deaths from tuberculosis that occurred throughout Los Angeles County.

Altogether, 15,325 different diagnoses of tuberculous conditions were recorded in the 6,085 autopsies in which tuberculous lesions were noted, or approximately 2.5 tuberculous conditions per patient. In some cases only a single tuberculous diagnosis was recorded, but in other instances more than a dozen different conditions might be mentioned. There were 1,649 cases in which inactive pulmonary tuberculosis was listed. Evidence of the extent of hematogenous dissemination is the fact that there were over 900 instances of tuberculous meningitis, 597 instances of general miliary tuberculosis (many of them also included under meningitis), 734 diagnoses of tuberculosis of the liver and 838 of the spleen, 886 instances of urinary and 414 of genital tuberculosis, 219 of bone tuberculosis, and 181 instances of endocrine tuberculosis, chiefly adrenal.

There were 1,084 instances of lymph node or lymphatic tuberculosis, 1,077 of tuberculous involvement of the pericardium and pleura, 428 of the peritoneum and 25 of the skin, most of which may have been considered the effects of lymphatic dissemination or contiguous extension. Intracanalicular spread resulted in 1,551 instances of gastrointestinal involvement and 389 instances of involvement of the larynx, trachea and bronchi. Further analysis of the distribution of tuberculous lesions in different parts of the body, and the channels of such distribution, and of the frequency with which various conditions were associated with eventually fatal tuberculosis or death from non-fatal tuberculous causes may reveal other interesting findings. The changes in the distribution of lesions and of the fatality rates associated with them, in the course of time reflect changes in the disease and in treatments used.

TABLE 2.—*Tuberculosis in Los Angeles County General Hospital Autopsies*

	Fatal Tuberculosis						Non-fatal Tuberculosis					
	1918-37	%	1938-48	%	Total	%	1918-37	%	1938-48	%	Total	%
Total	2,250	100	1,385	100	3,635	100	859	100	1,591	100	2,450	100
Male	1,430	63	932	65	2,362	65	607	72	1,149	72	1,756	72
Female	820	37	453	35	1,273	35	252	28	442	28	694	28
Caucasian	1,068	46	785	57	1,853	51	671	79	1,356	85	2,027	83
Mexican	963	45	378	27	1,341	37	133	15	118	7	251	10
Negro	137	6	169	12	306	8	43	5	89	6	132	5
Other	82	3	53	4	135	4	12	1	28	2	40	2
Age												
0-9	389	17	163	12	552	15	20	2	7	....	27	1
10	207	9	65	5	272	8	15	2	11	1	26	1
20	469	21	196	14	665	18	43	5	30	2	73	3
30	375	17	240	17	615	17	73	8	98	6	171	7
40	317	14	226	16	543	15	125	14	155	10	280	11
50	195	8	213	15	408	11	194	23	294	19	488	20
60	148	6	190	14	338	9	179	21	421	26	600	24
70	70	3	64	5	134	4	143	17	405	25	548	22
80 and over	19	1	28	2	47	1	49	6	170	11	219	10
Unknown	61	3	....	0	61	2	18	2	....	....	18	1

Extensive, detailed tabulations of the various forms of tuberculosis, and of combinations of tuberculosis in different parts of the body, as well as the association of tuberculous with non-tuberculous disease, as observed at autopsy, have been carried out. It is hoped that before the end of another year, these tabulations may be completed. Study of the incidence of tuberculosis and other lesions at autopsy may lead to greater ability to recognize factors that may be associated with susceptibility to infection, disease and resulting death. This in turn may bring greater ability to interpret the factors affecting these changes and to devise measures which may accelerate the eradication of tuberculosis.

The Present-Day Usage of Pneumothorax in the Treatment of Pulmonary Tuberculosis

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SUMMARY

The patient with tuberculosis must heal himself. Collapse measures help in the healing process by making the environment of the tubercle bacilli in the lungs more intolerant of multiplication and spread. The usage of pneumothorax has decreased; ten years ago it was used for over 50 per cent of patients, now for less than 10 per cent. This reduction in usage is not a condemnation of the procedure but an index of the more judicious aplication of the treatment as adjuvant to other accepted forms of therapy. Pneumothorax, because it is so versatile and flexible, lends itself most effectively to combination with other collapse procedures. Its use for well selected purposes is still indicated, but in much more narrow limits than previously applied.

THE patient with tuberculosis must cure himself. The final conquest or destruction of the tubercle bacilli is a victory of the body itself. Physicians guide and assist the resisting forces of the diseased body against the rapid multiplication and spread of the invading germs. The general measures of rest and good nutrition remain basic in the treatment. All measures of collapse therapy are clumsy and extravagantly inefficient; the more involved the procedure, the more expensive it is in functional loss to the patient. The ideal cure of any disease is the total eradication of it with the least resulting loss of function of the involved tissue or organ. Measures of treatment should be selected and applied with this always in mind. After all, surgical measures involving resection of parts and permanent loss of functions, in varying degrees, represent defeat of medicine. This is not the fault of the surgeon. It is more the fault of the physician and of the limitations of medical knowledge which permit the disease to go on unprevented and undiagnosed until it has reached such stages as demand the serious loss of function to win life.

Surely all physicians are looking forward to the day when all collapse measures can be described as clumsy methods of the past, rather than to the continued development and refinement of more procedures entailing removal and loss of function, even though the technical accomplishment carries credit and glory. Research for the accomplishment of cure of tuberculosis is and must remain in the realm of prevention, of early diagnosis, and of specific bactericidal agents to stop the development of such stages of disease as require collapse therapy. Yet, until those goals are achieved, the measures which must be utilized to save life, clumsy as they may be, cannot be abandoned and efforts to improve them must continue.

Pneumothorax, as a treatment for pulmonary tuberculosis, has had wide usage all over the world for over 40 years. No other active definitive method of treatment has had such universal application. Surely such long usage by physicians of all beliefs, opinions, and convictions as regards rest, climate, specific cures, surgical procedures, and psychosomatic attitudes must have brought out the good and evils of the treatment. When pneumothorax was introduced as a form of treatment, it was the only method of collapse therapy known. It was first received with misgivings, damnations, and limited application; it was first applied in hopeless cases when rest, food, and climate had failed. Gradually, a safe, sane level of application was found, but still its advantages were pushed and extended into the zone of hazards and uselessness because many times there was no other treatment to offer and trial was justified. This era, extending into the time of the perfection of thoracic operations, was padded with overuse and misuse of the treatment. But the recog-

Presented at the annual meeting of the California Tuberculosis and Health Association and the California Trudeau Society, March 30-April 1, 1950, San Diego.